

# EVIDENCE FOR THE EXISTENCE OF THE MEDIEVAL WARM PERIOD IN CHINA

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**Abstract.** The collected documentary records of the cultivation of citrus trees and *Boehmeria nivea* (a perennial herb) have been used to produce distribution maps of these plants for the eighth, twelfth and thirteenth centuries A.D. The northern boundary of citrus and *Boehmeria nivea* cultivation in the thirteenth century lay to the north of the modern distribution. During the last 1000 years, the thirteenth-century boundary was the northernmost. This indicates that this was the warmest time in that period. On the basis of knowledge of the climatic conditions required for planting these species, it can be estimated that the annual mean temperature in south Henan Province in the thirteenth century was 0.9–1.0 °C higher than at present. A new set of data for the latest snowfall date in Hangzhou from A.D. 1131 to 1264 indicates that this cannot be considered a cold period, as previously believed.

## 1. Introduction

Since the thermal optimum of the Holocene, the general trend of temperature in China has been a decline with secondary fluctuations of cooling and warming. The cooling stage, namely the Little Ice Age, has been discussed in more detail elsewhere (Grove, 1988; Zhang, 1991, 1992), as have the warming stages in the Han Dynasty (second century B.C.) and the Tang Dynasty (seventh to ninth centuries) (Chu, 1973). As for the Medieval Warm Period, nominally assigned to A.D. 900 to 1300, its existence in China has also been established by reference to contemporary documents.

There exist numerous records of the cultivation of citrus trees and the harvest of *Boehmeria nivea* (a perennial herb) in old Chinese documents. These records reflect the changes in where they were planted at different times. Both citrus and *Boehmeria nivea* are subtropical plants, whose growth and yield depend so closely on thermal conditions that we can adopt their planting boundary as a good indicator of temperature variations. We may also consider the period in which they were grown furthest north as the warmest period. Knowledge of modern climate limitations of their successful cultivation and harvest can be used to infer historical climatic conditions as their northern boundary. Chu (1931, 1973) considered the period around A.D. 1200 to be cold. This conclusion was in part based on a set of data on snowfall dates in Hangzhou in the South Song Dynasty. Recently the author's work based on a recalculation of the calendar conversion from the original lunar calendar to a solar calendar for ancient original records, revealed that almost all of the recalculated dates are earlier than thought hitherto. Consequently, the